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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/509,303

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Satoshi Aoki

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EXAMINER

GARDNER, SHANNON M

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

03/12/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/509,303	Applicant(s) AOKI, SATOSHI	
	Examiner Shannon Gardner	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 August 2009 (RCE).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2,4,8 and 10 is/are pending in the application.
- 4a) Of the above claim(s) 4,8 and 10 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Applicant's amendment of 10/28/2008 does not render the application allowable.

Remarks

Applicant has amended claim 2. Claims 4, 8 and 10 are withdrawn. Claim 2 is rejected on the merits below.

Status of Objections and Rejections

The rejections of claim 2 are withdrawn in view of Applicant's amendment. New grounds of rejections necessitated by amendment are set forth below.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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3. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bayon et al. (*Preparation of Indium Hydroxy Sulfide $\text{In}_x(\text{OH})_y\text{S}_z$ Thin Films by Chemical Bath Deposition*) in view of Nakada et al. (*High-Efficiency Cadmium-free $\text{Cu}(\text{In}, \text{Ga})\text{Se}_2$ Thin-Film Solar Cells with Chemically Deposited ZnS Buffer Layers*).

As to claim 2, Bayon is directed to a method of fabricating a thin-film compound solar cell wherein the buffer layer is formed by chemical bath deposition using an aqueous solution for dipping, the buffer layer in the first and second steps being formed by regulating the pH of the aqueous solution (of indium(III) chloride, acetic acid, and thioacetamide) in the range 1 to 3.5 (Bayon teaches a pH of about 3) to obtain a deposition rich in InS and the buffer layer in the third step being formed by regulating the pH of the aqueous solution in a range higher than 3.5 to obtain a deposition rich in InOH-InO, the structure of the buffer layer changing in response to the change in pH (see title; pp 2775, column 1 **Experimental** section, and column 2 **Results and Discussion** section). The Examiner notes that a *prima facie* case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties (MPEP 2144.05) and thus Bayon's teaching of a pH higher than 3 (pp 2775, column 3, 5th paragraph) renders the pH in the range of 3.5 to 12.0 obvious. Further, the Examiner notes that Bayon is directed to the formation of indium hydroxyl sulfide thin films by chemical bath deposition in an aqueous solution of indium(III) chloride, acetic acid, and thioacetamide where in concentrations of acetic acid and thioacetamide

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concentrations were varied to obtain different growth rates and layer thicknesses (pp 2775, 1st column 3rd paragraph) which inherently affects the pH of the solution.

Bayon is silent as to the regulation of the temperature of the aqueous solution during the formation of the layer.

However, it is known in the solar cell thin-film art to fabricate a thin-film compound having an n-type buffer layer (Nakada - Introduction pp 2093) formed therein for providing a heterojunction with a p-type semiconductor light absorbing layers (CIGS) (pp 2094, section II(B)) formed on a back electrode wherein, the buffer layer is formed on the light absorbing layer (pp 2093, section II (A)) wherein the CBD process (being continuously stirred – pp 2093, section II(A)) comprises a first step of holding the solution with the light absorbing layer surface dipped therein at a first preset temperature for a first preset time (room temperature) (pp 2093, section II (A)), a second step of heating the solution for a second preset time to a second temperature higher than the first temperature (pp 2093, section II (A)) and a third step of holding the solution at the second temperature for a third preset time (80°C) (pp 2093, section II (A)) as taught by Nakada to monitor the growth rate and particle size of the thin-film. Nakada teaches the aqueous CBD solution's temperature rising from room temperature to 80°C (pp 2093, section II(A)). During this temperature rise, there will be an intermediate temperature reached at some time that will be higher than the first temperature. The time at which the CBD begins reads on the instant first preset time, the time at which CBD is concluded reads on the instant third preset time, and the time

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at which the intermediate temperature is reached reads on the instant second preset time.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to monitor/regulate the temperature of the aqueous solution of Bayon as taught by Nakada in order to monitor the growth rate and particle size of the thin film.

Further, monitoring both the temperature and/or the pH of the solution is considered routine experimentation to one skilled in the art and therefore it would have been obvious to try varying temperatures/pH values in the method taught by modified Bayon (MPEP 2141 II).

Response to Arguments

4. Applicant's arguments filed 8/5/2009 have been fully considered but they are not persuasive:

Applicant argues that "Bayon does not disclose nor suggest that different quality of deposits in a buffer layer by stepwise regulating pH value in the first and second steps and in the range of 3.5 to 12 in the third step, as in the process of the present invention" (pp 4 of Arguments).

The Examiner respectfully disagrees. Though Bayon does not specifically teach the different quality in deposits in the buffer layer, the reference renders the method of claim 2 obvious. As such, one of ordinary skill would understand that the buffer layer deposited will be the same as the buffer layer claimed.

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Applicant argues that "It is apparent...that Nakada has not considered increasing the light transmittance of the buffer layer by gradually increasing grain size of deposits in the buffer layer in the direction away from the substrate" (pp 5 of Arguments).

The Examiner respectfully notes that Nakada is relied upon to teach that it is known to monitor/regulate the temperature of an aqueous solution during film deposition by a CBD process. Further, though Applicant asserts that Nakada describes a process "repeatedly increasing temperature from room temperature to 80°C", it is clear that one run from room temperature to 80°C is relied upon for the current rejection (see Nakada, **Experimental** part A, first paragraph).

Applicant argues that "Both the cited references (Nakada and Bayon) do not disclose the above-discussed process of the present invention, which can produce a buffer layer having a structure featured by gradually changing the quality of the deposits" (pp 5 of Arguments).

The Examiner respectfully disagrees and directed Applicant above for a full discussion of the references as applied to the present claim. Further, the Examiner notes that as the references (Bayon in view of Nakada) render the present method obvious, the method is fully capable of producing the instant buffer layer.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shannon Gardner whose telephone number is (571)270-5270. The examiner can normally be reached on Monday to Thursday, 5am-3pm EST.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571.272.1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. G./
Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795